DOCKET NO. 10847ABUS (NORT10-00170) **PATENT**
Customer No. 33000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of	:	Ayman Bedair, et al.
Serial No.	:	09/475,269
Filed	:	December 30, 1999
For	:	ADAPTIVELY MAINTAINING QUALITY OF SERVICE (QoS) IN DISTRIBUTED PBX NETWORKS
Group No.	:	2666
Examiner	:	K. Harper

MAILSTOP AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

DECLARATION OF PRIOR INVENTION UNDER 37 CFR 1.131

1. This declaration is to establish invention in this application in the United States (or a NAFTA or WTO country) at a date prior to September 14, 1999, that is the effective date of publication of United States Patent No. 5,953,338 cited by the U.S. Patent and Trademark Office (in the Office Action having a mailing date of May 17, 2006).

2. The persons making this Declaration are the inventors, Ayman Bedair, Zlaten Dedic, and Andre M. Cyr.

3. To establish the date of the invention of this application, the following attached documents are submitted herewith as evidence: Invention disclosure pages (3 pages).

4. The invention in this application was (1) reduced to practice at least as early as September 13, 1999, which is prior to the effective date of the reference; and/or (2) was conceived at least as early as September 13, 1999, which is prior to the effective date of the reference, coupled with due diligence from prior to the effective date of the reference to a subsequent reduction to practice or to the filing of the application. Upon information and belief, the effective date of the reference is September 14, 1999 and this application was filed on December 30, 1999 (approximately three and one-half months after the effective date of the reference) which evidences due diligence from prior to the effective date of the reference to the filing of this application.

5. Upon information and belief, this Declaration is being submitted prior to final rejection.

6. As a person signing below:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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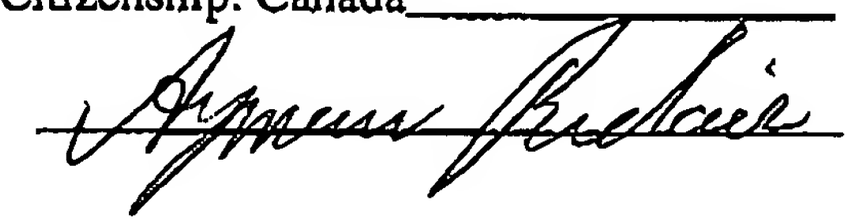
Inventor Signature: 

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Invention Disclosure Submission Reply

Disc No:	10847AB	**Received Date:**	[redacted]
Disclosure Title:	QoS Monitoring		

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---=== Attachments ===---

<End of Attachments>

Were there additional inventors involved:	yes	**Was there contractor involvement:**	no
Name of Supervisor or Divisional Head:		**Name of VP:**	
ALEX PIERSON		PARTICK RHODES	
LOB:	Enterprise Solutions	**Business Unit:**	Enterprise Voice
Conception Date:			
Has this invention been discussed with others? If so, please complete:			
Inside Nortel - Whom?		**Outside Nortel - Whom?**	
Inside Nortel - When?		**Outside Nortel - When?**	
NDA?	no		
Are you aware of any imminent future disclosures? Please provide dates and details:			
Product is scheduled for Beta release in [redacted], and GA in [redacted]			
Keywords for Searching:		**Products that will use this invention:**	
Does this invention arise from any arrangement involving an external organization?		no	
Is this invention relevant to a Standards Activity?		**Internal Funding Project #'s:**	
no		25082	

Technical Information

Brief Description of the Invention:

Add intelligence to the application layer to react to changes of the IP network.

Problem Solved by the Invention:

This invention provides an adaptation mechanism, which can be used to maintain and control voice quality for communication among end-systems in a distributed PBX topology. The idea stems from the control theory, in which output from an IP LAN (a black box) is used to adjust the next input to the LAN. As a result, the communication link can adapt to the changing conditions of the LAN in a fast way and with minimum (or non) manual intervention. The proposed solution will enhance the overall system performance.

The application transmits a maximum of 320 voice channels every 125 micro sec. The maximum bandwidth (voice + signaling) required is approximately 30Mbps. Since the voice packets occupy the largest share of this bandwidth, the mechanism uses them as an indicator of the network behavior and attempt to react to these measurements.

Solutions that have been tried and why they didn't work:

Having a fixed CDV (Cell Delay Variation) buffer size might not be an ideal solution in a bursty IP Network. Manual attempts to set the buffer size, is a tedious process due to the redundancy of the traffic flow, and is usually based on trial and error.

The communication link between the PBXs requires a fairly large bandwidth (approximately 30Mbps full duplex). Maintaining this bandwidth is first of all expensive and might result in degrading the overall quality of service of all applications running on the network. Attempting to reserve the bandwidth is an expensive solution to the problem (using either RSVP or a policy management system) since 30Mbps will be required all the time.

The main obstacle in implementation is how measurements are obtained, several algorithms have been tested among them:
Using ICMP produces inaccurate measurements for the following reasons:
- Adding more traffic to the network. The added traffic is directly proportional to the accuracy of the measurements.
- Several Real-time operating systems do not allow multi-application to use raw sockets (used mainly for ICMP), this usually results in interference between applications using these sockets.

Using TCP or UDP:
- Added overhead on both end systems, represented by the need to create at least one task on each end machine to simulate functionality of ICMP.
- Add-on processing time (raw sockets interact directly with the Network Layer, other types of sockets interact with upper layers of the IP stack). This can results in inaccuracy of the sending and arrival time of the messages.
- As in ICMP the added traffic to the network.

Specific elements or steps that solved the problem and how they do it:

Measurements:
Three parameters will be supplied by the hardware, namely:
· Roundtrip time: obtained directly from voice packets
· Packet out sequence counter: which will be used as an indicator of packet loss.
. CDV buffer underflow/Overflow: an indicator of incorrect CDV buffer size specification

Pooling these registers either at fixed time or time varying time intervals will be used to tune the PBX input to the network.
Among these parameters:
- CDV buffer size tuning; based on the history of the one or several settings, the next setting will be predicted.
- Enable blocking; to reduce the bandwidth utilization. This is achieved by defining one or many thresholds of degradation levels based on the roundtrip time and packet loss. Once a threshold is reached, reduction of the number of channels will start. The reduction can be done per channel, or blocks of channels.
- Enable bandwidth optimization: similar to Enable blocking mechanism, bandwidth compression by reordering busy channels eliminating idle channels from being transmitted.
- Switch to survivable mode: the mechanism can notify upper software layers that the Quality of Service has exceeded the defined intolerable degraded service threshold.
- Provide the user with an assessment of the network performance from the PBX prospective.

This mechanism can run:
- Independently on each end-system.
- On one end-system with one way synchronization to the other end-system(s) (centralized mode)
- On both end-system with two way synchronization (distributed mode).

Commercial value of the invention to Nortel and Nortel's major competitors:

Market: Meridian 1 using networked multi-cabinet system.
Can also be extended to any networked, multi-card, multi-end-point system.

[redacted]